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Barbara Felton

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**Attorney Docket No.: 100794-11371 (FUJH 16.870)**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
**BOARD OF PATENT APPEALS AND INTERFERENCES**

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| Appellant(s) | : | Akihiro YAMORI<br>Takashi HAMANO<br>Kiyoshi SAKAI<br>Kouji YAMADA |
| Serial No. | : | 09/526,619 |
| Filed | : | March 16, 2000 |
| For | : | *Moving Pictures Encoding Method and Apparatus* |
| Examiner | : | Y. Young Lee |
| Group Art Unit | : | 2613 |

May 22, 2006

**REPLY BRIEF**

Board of Patent Appeals and Interferences
Assistant Commissioner for Patents
Washington, D.C., 20231

Sir:

Appellants submit this Reply Brief in response to the Examiner's Answer mailed on March 21, 2006. All requisite fees may be charged to Deposit Account No. 50-1290.

In response to Appellants' December 12, 2005 Appeal Brief, the Examiner maintained that the motion prediction apparatus illustrated in Fig. 6 of U.S. Patent No. 6,430,223 to Lim can exclude the moving vectors illustrated Figs. 9B and 10C and only use the moving vectors illustrated in Figs. 9C and 10B of Lim. The Examiner contended that Lim, therefore, discloses the claimed invention. In particular, the Examiner argued that elements 64-70 illustrated in Fig. 6 of Lim operate to allow for any combinations of top and bottom field prediction variations from half-pixel motion vector detector 62. Page 4, line 16 to page 5, line 7 of the Examiner's Answer. The Examiner's assertion that elements 64-70 illustrated in Fig. 6 of Lim provide for a "combination" of Figs. 9B and 10C without Figs. 9C and 10B is inaccurate.

Again, as illustrated in Fig. 3 of Lim, integer moving vector searching for moving pictures in MPEG-2 is executed in five ways: Frame, Top-to-Top, Bottom-to-Top, Top-to-Bottom, and Bottom-to-Bottom – please see motion estimator 22 in Fig. 3 of Lim. Frame prediction is the moving vector searching, in which a moving vector is searched with a frame formed by, say for a P picture, Top (2)/Bottom (2) (of a current frame) in each line as an original picture, and a frame formed by, say, Top (1)/Bottom (1) (of a forward reference frame) in each line as a reference picture. Correspondingly, Top-to-Top prediction is a field prediction, which uses Top (2) as original and Top (1) as reference; Bottom-to-Top prediction is a field prediction, which uses Top (2) as original and Bottom (1) as reference; Top-to-Bottom prediction is a field prediction, which uses Bottom (2) as original and Top (1) as reference; and Bottom-to-Bottom prediction is a field prediction, which uses Bottom (2) as original and Bottom (1) as reference.

A conventional method of moving vector searching for all five ways would require a large number of calculations. Thus, Lim proposed performing integer moving vector searching only for the Top-to-Top and Bottom-to-Bottom moving vectors—$MV_{tt}$ and $MV_{bb}$, respectively—

as illustrated by reference numeral 52 in Fig. 6 of Lim. Correspondingly, Lim described that the remaining moving vectors—Frame ("$MV_{ff}$"), Bottom-to-Top ("$MV_{bt}$"), and Top-to-Bottom ("$MV_{tb}$")—may be obtained from these two moving vectors, $MV_{tt}$ and $MV_{bb}$, by performing scale calculations in light of time distribution. The half-pixel vector calculation and determination of the frame prediction or field prediction would be processed by using the thusly-scale-calculated vectors $MV_{ff}$, $MV_{bt}$, and $MV_{tb}$, resulting in drastically reduced number of calculations in connection with redundant moving vector searching.

Thus, for a P picture, Fig. 9A of Lim illustrates such scale calculations for a Bottom-to-Top moving vector $MV_{bt}$ in terms of the Top-to-Top moving vector $MV_{tt}$ by scaler 56 in Fig. 6 of Lim, and Fig. 10A of Lim illustrates such scale calculations for a Top-to-Bottom moving vector $MV_{tb}$ in terms of the Bottom-to-Bottom moving vector $MV_{bb}$ by scaler 58 in Fig. 6 of Lim. Correspondingly, for a bidirectional B picture, Figs. 9B and 9C illustrate the respective forward and backward component $MV_{bt}$ from $MV_{tt}$, and Figs. 10B and 10C illustrate the respective forward and backward component $MV_{tb}$ from $MV_{bb}$. Please see, e.g., col. 10, line 3 to col. 11, line 48 of Lim. And as described in col. 9, lines 4-31 of Lim, the first multiplexor 64 selects the better one of Top-to-Top $MV_{tt}$ and Bottom-to-Top $MV_{bt}$, and second multiplexor 66 selects the better one of Top-to-Bottom $MV_{tb}$ and Bottom-to-Bottom $MV_{bb}$.

Lim describes that frame/field determination is performed by the sum of prediction errors (motion detection error) of two field predictions and the prediction error of the frame prediction. In other words, Lim only describes prediction integer vector generation in one direction at a time. Thus, Lim only describes first multiplexor 64 choosing between $MV_{tt}$ and $MV_{bt}$ (as shown in Fig. 9B), and second multiplexor 66 choosing between $MV_{bb}$ and $MV_{tb}$ (as shown in Fig. 10B) for the forward component top and bottom fields of a B picture. And for the backward

component top and bottom fields, Lim describes first multiplexor 64 choosing between $MV_{tt}$ and $MV_{bt}$ (as shown in Fig. 9C), and second multiplexor 66 choosing between $MV_{bb}$ and $MV_{tb}$ (as shown in Fig. 10C).

Again, Lim only describes prediction integer vector generation in one direction at a time. Thus, contrary to the Examiner's assertions in his Answer, elements 64-70 described in Lim cannot provide for predicting a top field of a B picture with only its forward component while predicting a bottom field with only its backward component, and generating a predictive picture according to such a prediction.

Firstly, Lim does not disclose multiplexor 66 choosing between backward component vectors $MV_{bb}$ and $MV_{tb}$ (as shown in Fig. 10C) when multiplexor 64 is choosing between forward component vectors $MV_{tt}$ and $MV_{bt}$ (as shown in Fig. 9B). Lim only describes multiplexor 66 choosing between forward component vectors $MV_{bb}$ and $MV_{tb}$ (as shown in Fig. 10B) when multiplexor 64 is choosing between forward component vectors $MV_{tt}$ and $MV_{bt}$ (as shown in Fig. 9B). Correspondingly, Lim only describes multiplexor 64 choosing between backward component vectors $MV_{tt}$ and $MV_{bt}$ (as shown in Fig. 9C) when multiplexor 66 is choosing between backward component vectors $MV_{bb}$ and $MV_{tb}$ (as shown in Fig. 10C).

And secondly, Lim does not disclose combining the forward and backward components of a B picture without the backward component vector for the top field, either $MV_{tt}$ or $MV_{bt}$, shown in Fig. 9C, and without the forward component vector for the bottom field, either $MV_{bb}$ or $MV_{tb}$, shown in Fig. 10B.

Indeed, Appellants refer to equations (6), (7), (10), and (11) in Lim. These equations cannot yield, for given whole number frame spaces M and PB, zero scaling factors for only the moving vectors illustrated in Figs. 9B and 10C. Thus, Lim describes scaling calculations that

cannot yield predictions based only from the moving vectors illustrated Figs. 9C and 10B without using those illustrated in Figs. 9B and 10C.

Finally, the Examiner even acknowledged that Lim "does not describe a method identical to that illustrated in appellant's Figure 1," features of which are recited in the rejected claims. The Examiner alleged that the claims are too broad such that they "read on" the disclosure of the Lim. Again, Lim requires both Figs. 9B and 9C for a top field of B picture—either $MV_{tt}$ or $MV_{bt}$ for respective forward and backward components—and both Figs. 10B and 10C for a bottom field of a B picture—either $MV_{bb}$ or $MV_{tb}$ for respective forward and backward components. Lim does not disclose predicting a top field of a picture frame from only the forward picture frame and a bottom field of the picture frame from only the backward picture frame, and generating a predictive picture according to such a prediction. These features are positively recited in base claims 23 and 26 and are not read-in from the specification of the application. Thus, Appellants submit that the following claim features recited in base claim 23—and corresponding features in base claim 26—do not "read on" any system or method described in Lim,

> "[a] moving pictures encoding method for encoding a picture frame of an input signal by predicting from both forward and backward picture frames, the picture frame having top and bottom fields, which respectively include odd numbers and even numbers of pixel scanning lines of the picture frame, the method comprising the steps of:
>
> first predicting in a macro-block unit composed of (n x n) pixels, the **top field** of the picture frame from either one of top and bottom fields of **only the forward picture frame, and the bottom field** of the picture frame from either one of top and bottom fields of **only the backward picture frame**;
>
> generating a predictive picture **according to the prediction**; and
>
> encoding the picture frame of the input signal by using the generated predictive picture." (Emphasis added)

Any fee due with this paper may be charged to Deposit Account No. 50-1290.

Respectfully submitted,

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